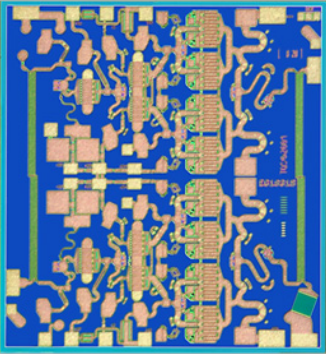


13 - 15 GHz 4W Power Amplifier



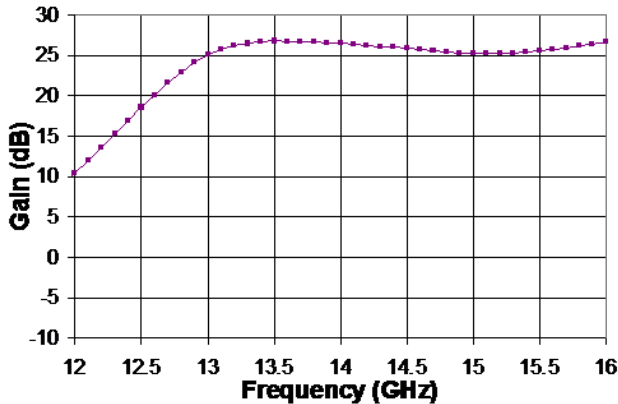
Chip Dimensions 2.5 mm x 2.7 mm x 0.1 mm

Key Features

- 0.5 um pHEMT Technology
- >25 dB Nominal Gain
- >36 dBm Nominal Psat
- 44 dBm Nominal IP3 @ 14 GHz
- Bias 7V @ 1.3A Idq, 2.1A under RF drive
- Chip Dimensions 2.5mm x 2.7mm x 0.1 mm

Fixtured Measured Performance

Bias Conditions: Vd = 7V, Idq = 1.3A



Primary Applications

- Ku-Band VSAT Transmit

Bias Conditions: Vd = 7V, Idq = 1.3A

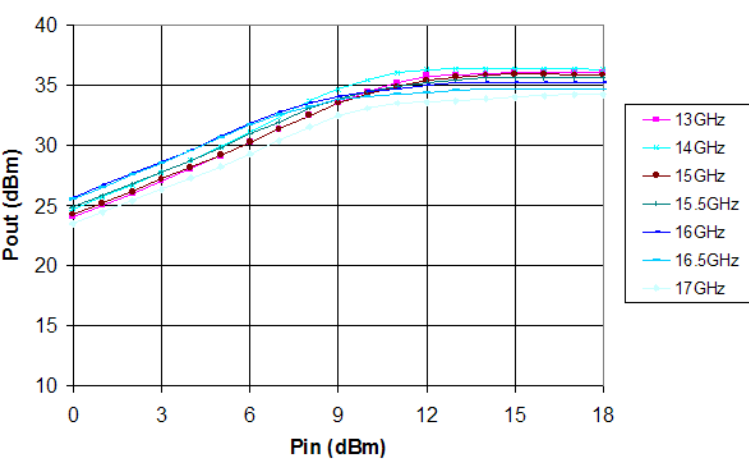


TABLE I
MAXIMUM RATINGS 1/

Symbol	Parameter	Value	Notes
V ⁺	Positive Supply Voltage	8V	
I ⁺	Positive Supply Current	2.3 A	<u>2/</u>
P _D	Power Dissipation	18.4	
P _{IN}	Input Continuous Wave Power	24 dBm	
T _{CH}	Operating Channel Temperature	200 °C	<u>3/</u> , <u>4/</u>
	Mounting Temperature (30 seconds)	320 °C	
T _{STG}	Storage Temperature	-65 °C to 150 °C	

- 1/ These values represent the maximum operable values of this device
- 2/ Total current for the entire MMIC
- 3/ These ratings apply to each individual FET
- 4/ Junction operating temperature will directly affect the device mean time to failure (T_m). For maximum life it is recommended that junction temperatures be maintained at the lowest possible levels.

TABLE II
ELECTRICAL CHARACTERISTICS
(Ta = 25°C ± 5°C)

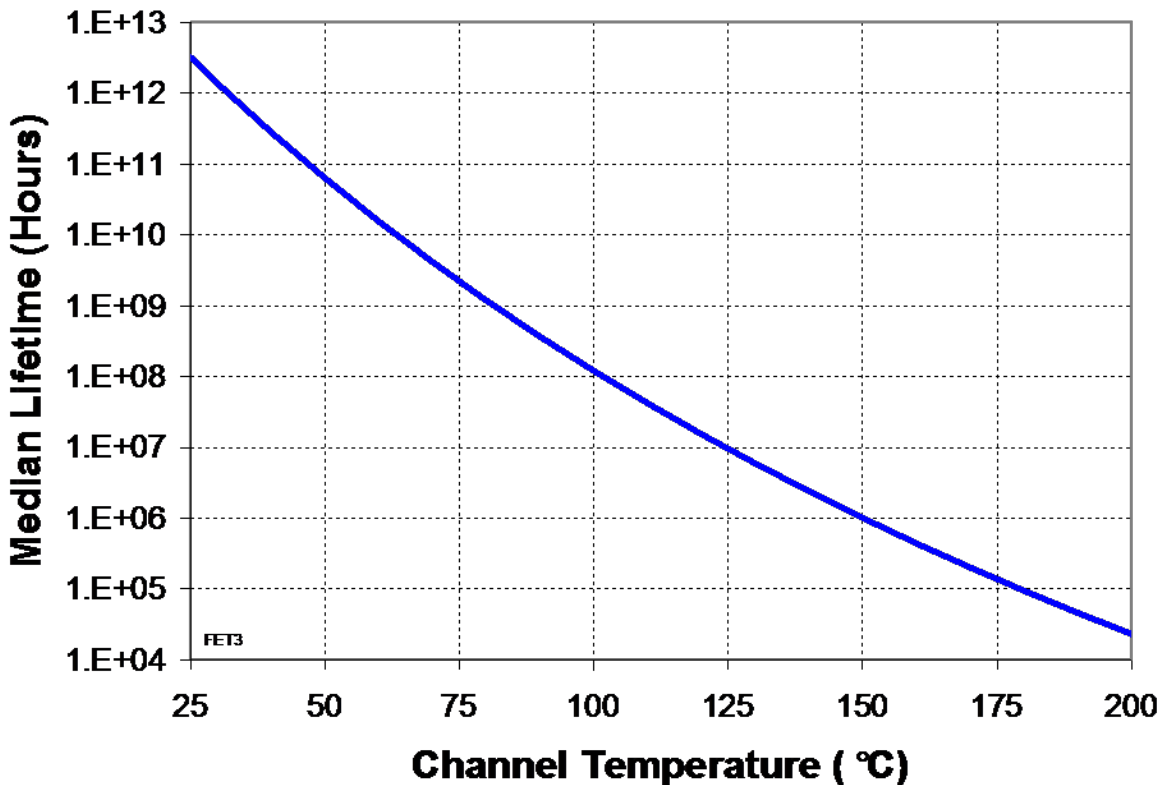
PARAMETER	TYPICAL	UNITS
Drain Operating Voltage	7	V
Quiescent Current	1.3	A
Small Signal Gain	25	dB
Gain Flatness (Freq=13.5 – 15 GHz)	0.1	dB/100MHz
Input Return Loss (Linear Small Signal)	16	dB
Output Return Loss (Linear Small Signal)	16	dB
Reverse Isolation	<-50	dB
CW Output Power @ Psat at 14.5Ghz	36	dBm
Power Add Efficiency @ Psat	30	%
P1dB Temperature Coeff. TC (-40 to + 70 °C)	-0.01	dB/°C

**TABLE IV
THERMAL INFORMATION**

PARAMETER	TEST CONDITIONS	T _{CH} (°C)	θ _{JC} (°C/W)	T _m (HRS)
θ _{JC} Thermal Resistance (channel to Case)	Vd = 7 V Id = 1.3 A Pdiss = 9.1 W	123	5.8	1.2E+7

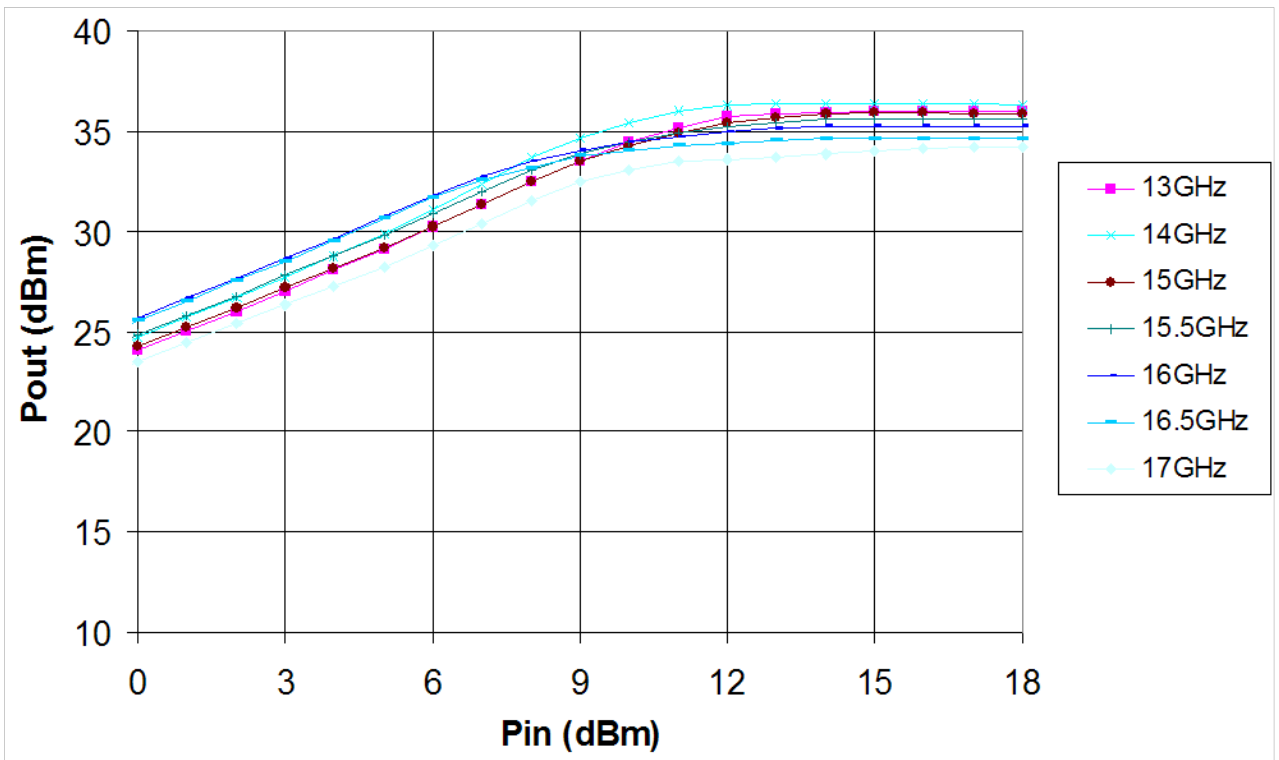
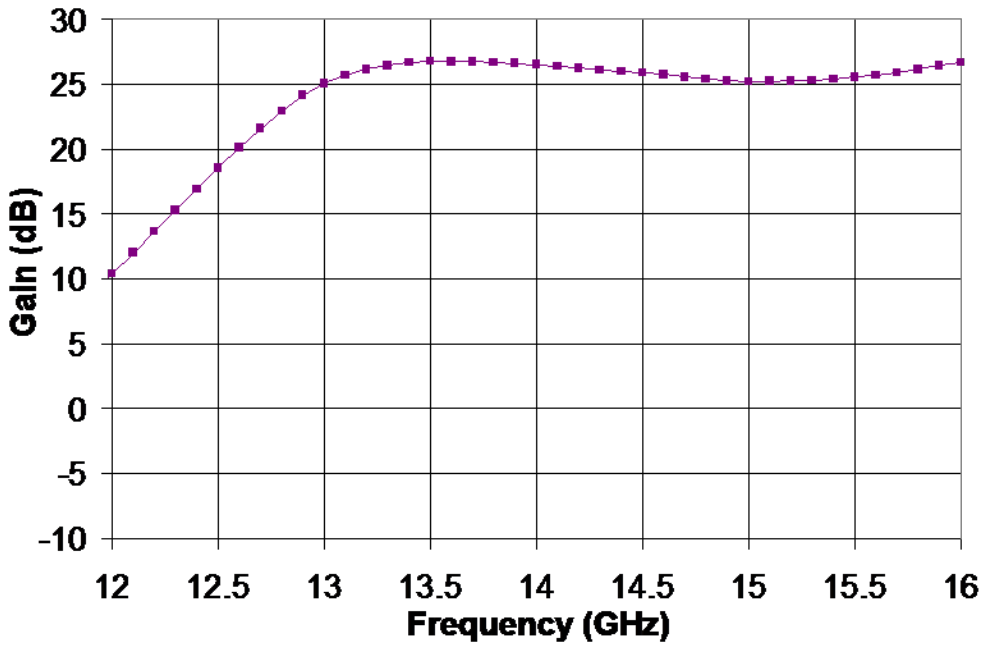
Note: Assumes eutectic attach using 1.5 mil 80/20 AuSn mounted to a 20 mil CuMo Carrier at 70°C baseplate temperature. Worst case condition with no RF applied, 100% of DC power is dissipated.

Median Lifetime (Tm) vs. Channel Temperature



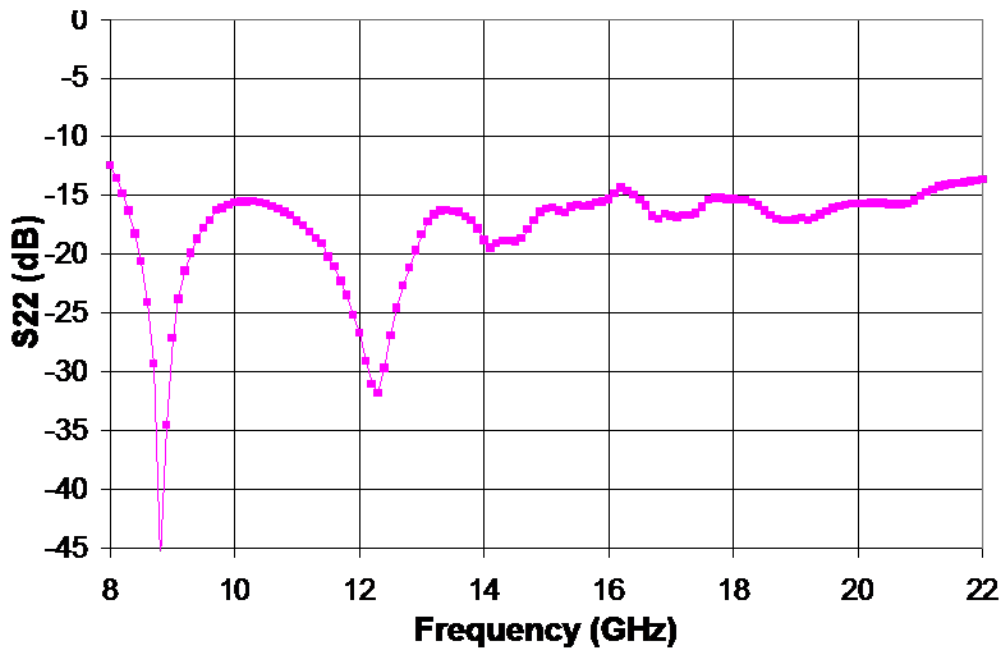
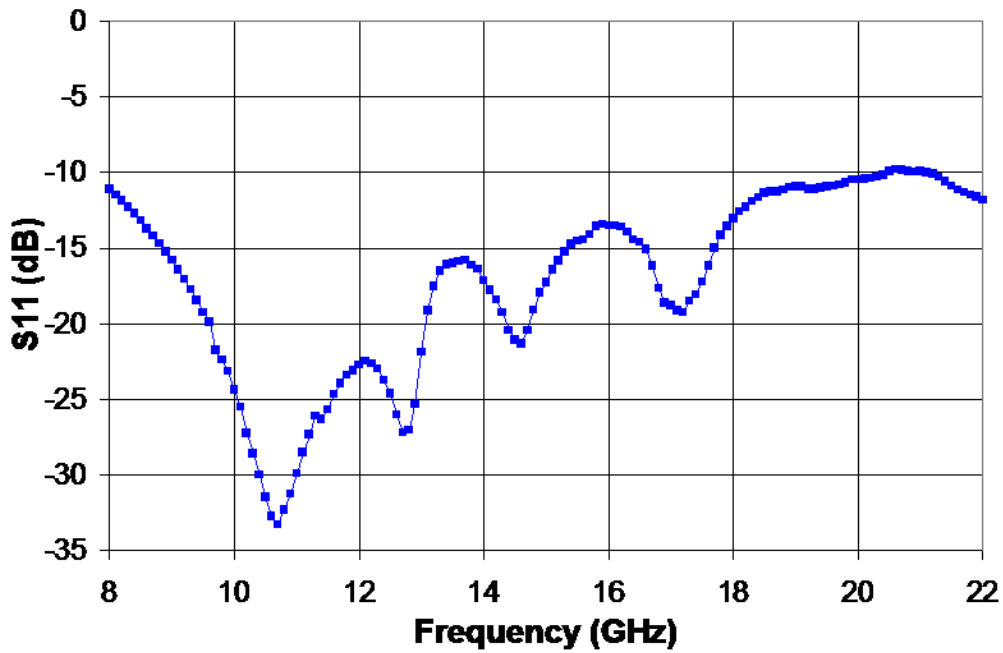
Measured Fixtured Data

Bias Conditions: $V_d = 7V$, $I_{dQ} = 1.3A \pm 5\%$



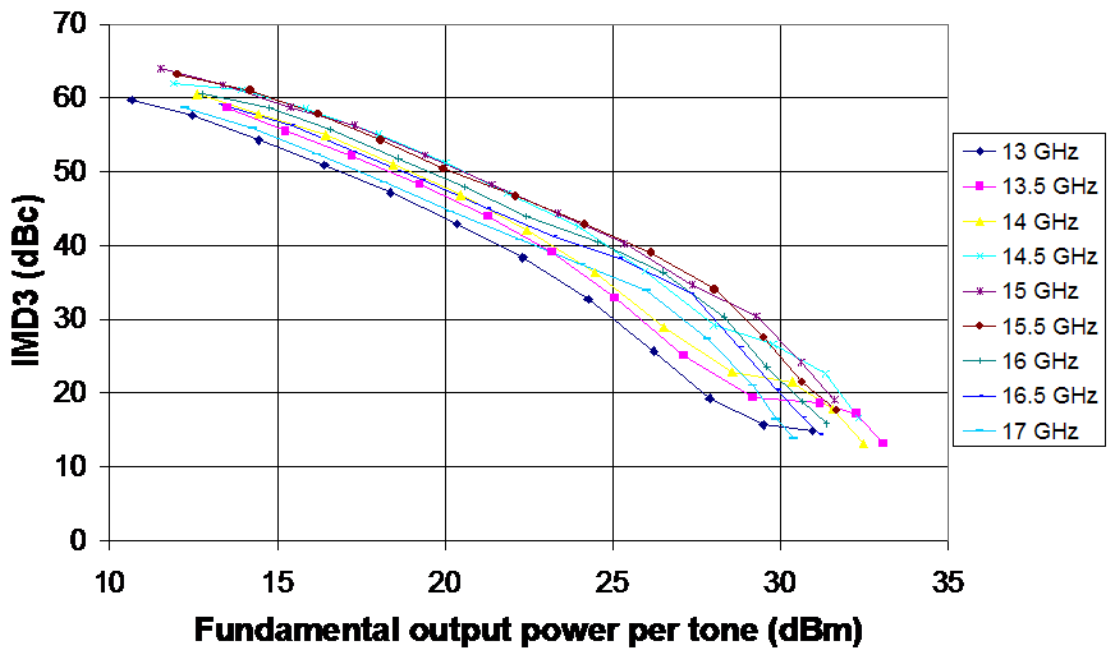
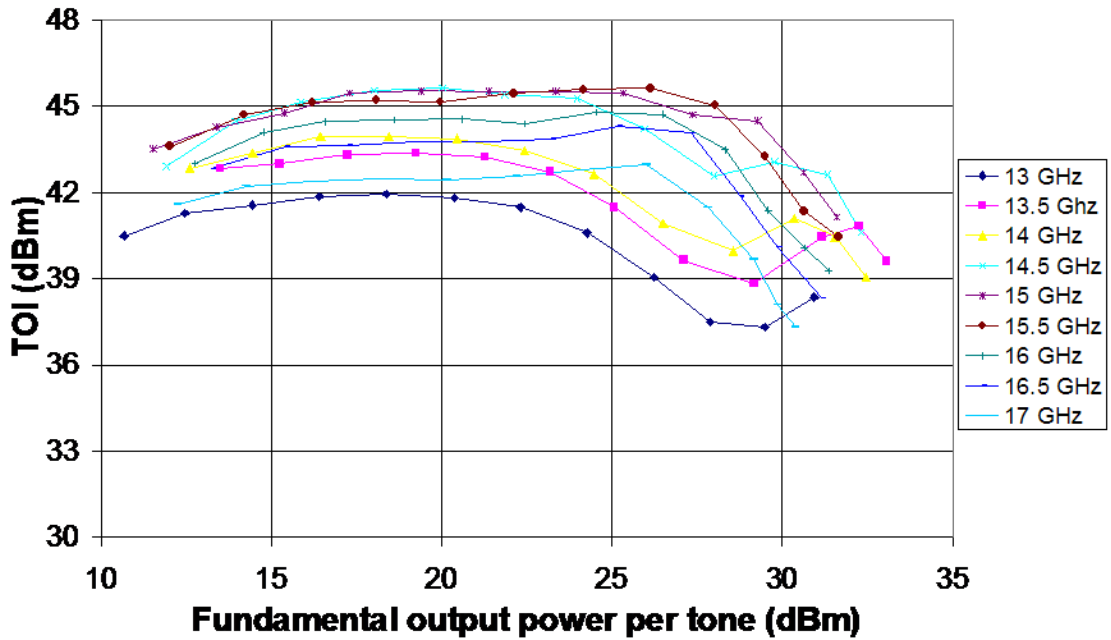
Measured Fixtured Data

Bias Conditions: $V_d = 7V$, $I_{dq} = 1.3A \pm 5\%$

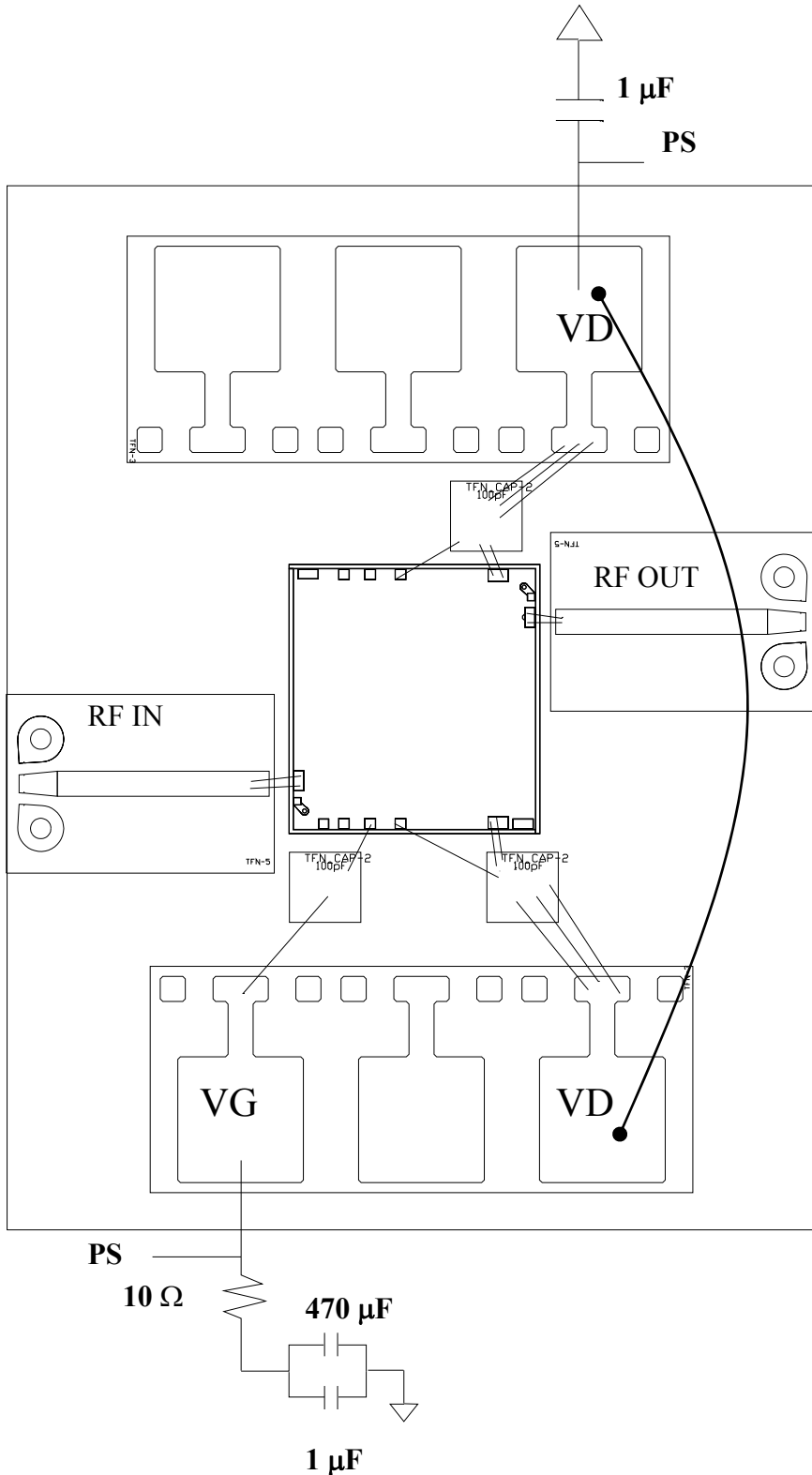


Measured Fixtured Data

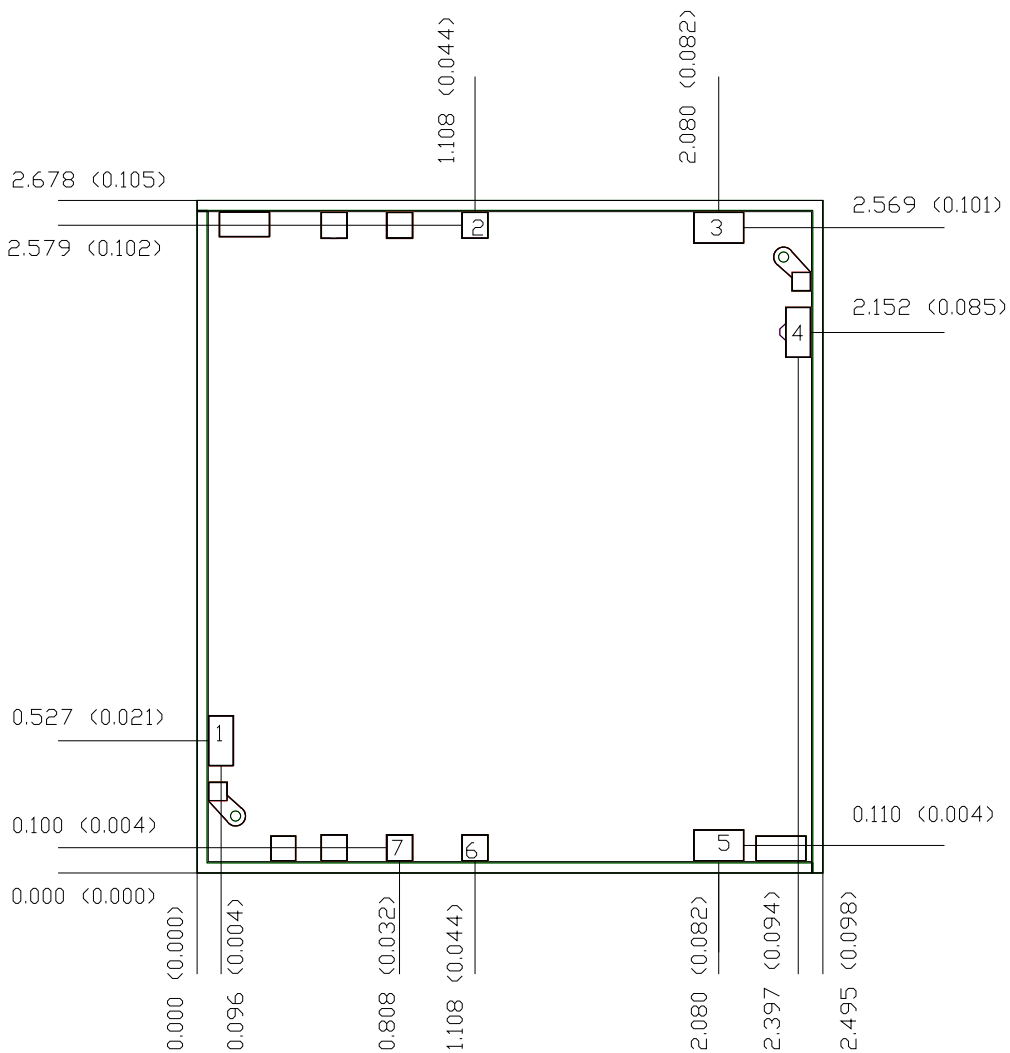
Bias Conditions: $V_d = 7V$, $I_{dq} = 1.3A \pm 5\%$



Chip & Assembly Diagram



Mechanical Drawing



Units: millimeters (inches)

Thickness: 0.1016 (0.004)

Chip edge to bond pad dimensions are shown to center of bond pad

Chip size tolerance: +/- 0.051 (0.002)

Bond pad #1	<RF In>	0.100 x 0.200 (0.004 x 0.008)
Bond pad #2	<Vd>	0.100 x 0.100 (0.004 x 0.004)
Bond pad #3	<Vd>	0.200 x 0.120 (0.008 x 0.005)
Bond pad #4	<RF Out>	0.100 x 0.200 (0.004 x 0.008)
Bond pad #5	<Vd>	0.200 x 0.120 (0.008 x 0.005)
Bond pad #6	<Vd>	0.100 x 0.100 (0.004 x 0.004)
Bond pad #7	<Vg>	0.100 x 0.100 (0.004 x 0.004)

GaAs MMIC devices are susceptible to damage from Electrostatic Discharge. Proper precautions should be observed during handling, assembly and test.

Assembly Process Notes

Reflow process assembly notes:

- Use AuSn (80/20) solder with limited exposure to temperatures at or above 300⁰C (30 seconds max).
- An alloy station or conveyor furnace with reducing atmosphere should be used.
- No fluxes should be utilized.
- Coefficient of thermal expansion matching is critical for long-term reliability.
- Devices must be stored in a dry nitrogen atmosphere.

Component placement and adhesive attachment assembly notes:

- Vacuum pencils and/or vacuum collets are the preferred method of pick up.
- Air bridges must be avoided during placement.
- The force impact is critical during auto placement.
- Organic attachment can be used in low-power applications.
- Curing should be done in a convection oven; proper exhaust is a safety concern.
- Microwave or radiant curing should not be used because of differential heating.
- Coefficient of thermal expansion matching is critical.

Interconnect process assembly notes:

- Thermosonic ball bonding is the preferred interconnect technique.
- Force, time, and ultrasonics are critical parameters.
- Aluminum wire should not be used.
- Maximum stage temperature is 200⁰C.

GaAs MMIC devices are susceptible to damage from Electrostatic Discharge. Proper precautions should be observed during handling, assembly and test.